1. A flywheel uninterruptible power supply, comprising:

an energy storage flywheel supported for rotation on a bearing system;

a brushless motor/generator for accelerating and decelerating said flywheel for storing and retrieving energy;

said flywheel is rotated in normal operation at a speed such that generator voltage is higher than the output voltage;

said power supplied to the load from the generator is a regulated output that is maintained at a substantially constant voltage level by using switching regulation of the alternating current voltage generated by the generator;

said switching regulation per generator phase occurs at a frequency equal to or less than twice the frequency of the generator alternating current;

whereby said flywheel uninterruptible power supply efficiently maintains power to an electrical load during an interruption of primary power by supplying power generated from said flywheel generator.

2. A flywheel uninterruptible power supply as described in claim 1; wherein:

said switching regulation is accomplished with switching devices which switch on to off at substantially zero voltage.

3. A flywheel uninterruptible power supply as described in claim 1, wherein:

said switching regulation from on to off occurs at substantially zero current.

4. A flywheel uninterruptible power supply as described in claim 1, wherein:

said switching regulation uses phase angle switching.

5. A flywheel uninterruptible power supply as described in claim 1, wherein:

said switching regulation uses zero crossover firing.

6. A flywheel uninterruptible power supply as described in claim 1, wherein:

said switching regulation is done using thryistors.

7. A flywheel uninterruptible power supply as described in claim 1 wherein:
said switching regulation is done using triacs.

8. A flywheel uninterruptible power supply as described in claim 1, wherein:
said regulated output is a direct current voltage.

9. A flywheel uninterruptible power supply as described in claim 1, wherein:
said regulated output is an alternating current voltage.

10. A flywheel uninterruptible power supply as described in claim 9, wherein:
said generator frequency, at the lowest speed that the flywheel provides output power, is greater than twice the frequency of the alternating current output.

11. A power system as described in claim 1 wherein the generator voltage at normal operating speed is more twice the voltage supplied to the output load.

12. A power system as described in claim 1 wherein the motor/generator is a permanent magnet synchronous machine.

13. A power system as described in claim 1 wherein:
said motor/generator is comprised of a separate motor and generator.

14. A power system for energizing a flywheel motor of a flywheel uninterruptible power supply, comprising:
a control system powered from a DC-DC converter that has an operating input voltage range greater than 4 to 1 and is connected to a direct current side of an inverter that provides alternating current power to accelerate said flywheel motor.

15. A power system as described in claim 14 wherein the control system includes circuits for magnetic bearing support of the flywheel.

16. A power system as described in claim 15 wherein the inverter for accelerating the motor is sensorless.

17. A power system for a flywheel uninterruptible power supply comprised of an energy storage flywheel supported for rotation on a bearing system and accelerated and decelerated using a brushless motor/generator for storing and retrieving energy,

said flywheel uninterruptible power supply prevents interruption of power to an electrical load during an interruption of primary power by supplying power generated from the flywheel generator,

said power supplied to the load is maintained at a substantially constant voltage level by using switching at a frequency less than 2 kilohertz.

18. A power system as described in claim 17 wherein the switching converts alternating current from the generator to the power for the load.

19. A power system as described in claim 17 wherein the flywheel is constructed mostly of steel.

20. A power system as described in claim 19 wherein the flywheel is supported for rotation using passive radial magnetic bearings.

21. A power system as described in claim 20 wherein said power supplied to the load from the generator is maintained at a substantially constant voltage level by using switching regulation of the alternating current voltage generated by the generator,

said switching regulation per generator phase occurs at a frequency equal to or less than twice the frequency of the generator alternating current.

22. A power system for a flywheel uninterruptible power supply comprised of an energy storage flywheel supported for rotation on a bearing system and accelerated and decelerated using a brushless motor/generator for storing and retrieving energy,

said flywheel uninterruptible power supply prevents interruption of power to an electrical load during an interruption of primary power by supplying power generated from the flywheel generator,

said flywheel is rotated in normal operation at a speed such that generator voltage is higher than the output voltage,

said power supplied to the load from the generator is maintained at a substantially constant voltage level whether alternating or direct current by using an output converter that is connected to a DC bus that receives power either directly or indirectly from both the primary source and the flywheel source; and

said output converter has an operating input voltage range greater than 3 to 1.

23. A power system as described in claim 22 wherein the flywheel that stores energy is constructed mostly of steel.

24. A power system as described in claim 23 wherein the flywheel is supported for rotation using passive radial magnetic bearings.

25. A power system for a flywheel uninterruptible power supply comprised of an energy storage flywheel supported for rotation on a bearing system and accelerated and decelerated using a brushless motor/generator for storing and retrieving energy,

said flywheel uninterruptible power supply prevents interruption of power to an electrical load during an interruption of primary power by supplying power generated from the flywheel generator,

said power supplied to the load from the generator is maintained at a substantially constant voltage level by using switching regulation of the alternating current voltage generated by the generator,

said switching regulation converts the alternating current voltage from the generator directly into a lower frequency alternating current output voltage without intermediately converting the power to direct current.

26. A power system as described in claim 25 wherein the generator has a field coil to

which a voltage is applied and increased as the flywheel speed decreases during a discharge.

27. A power system for a flywheel uninterruptible power supply that supplies protected alternating current power to a load upon failure of a primary power source, comprising:

a transformer through which said power from said primary power source is supplied to the load during operation of said primary power source;

said power supplied to the load during a loss of power from said primary power source is supplied by conversion of energy stored in said flywheel to power for said load.

28. A power system as described in claim 27, further comprising:

a transfer switch for switching between said flywheel power source and said transformer.